

154. A multistage interconnect network comprising:

(a) a plurality of switch nodes connected together, each of the switch nodes comprising a first plurality of input ports selectively connectable to a second plurality of output ports, the multistage interconnect network comprising more than $\lceil \log_b N \rceil$ stages of switch nodes, wherein b is a total number of switch node input/output port pairs, N is a total number of network input/output port pairs, and $\lceil \log_b N \rceil$ indicates a ceiling function providing the smallest integer not less than $\log_b N$, the stages thereby providing a plurality of paths between any network input port and network output port to enhance fault tolerance and lessen contention;

(b) the multistage interconnect network including forward channel and back channel signal paths between the switch nodes;

(c) the multistage interconnect network capable of multicast transmitting forward channel messages from a source connected to the multistage interconnect network to one or more destinations connected to the multistage interconnect network;

(d) the multistage interconnect network capable of combining back channel replies received from the destinations into a single result, wherein the result is transmitted on the back channel to the source.

155. The system of claim 154, wherein the multistage interconnect network steers a multicast request for a supercluster to a bounce back point within the network, wherein all multicast requests to the supercluster use the same bounce back point.

156. The system of claim 155, wherein the multistage interconnect network steers a multicast request from one supercluster to a destination supercluster through a bounce back point for the destination supercluster.

157. The system of claim 154, wherein the multistage interconnect network permits only one multicast request at a time within a supercluster, thereby preventing deadlock between competing multicast requests.

158. A method of operating a multistage interconnect network comprising:

(a) multicast transmitting forward channel messages from a source connected to the multistage interconnect network to one or more destinations connected to the multistage interconnect network, wherein the multistage interconnect network comprises a plurality of switch nodes connected together, the multistage interconnect network including forward channel and back channel signal paths between the switch nodes, each of the switch nodes comprising a first plurality of input ports selectively connectable to a second plurality of output ports, the multistage interconnect network comprising more than $\lceil \log_b N \rceil$ stages of switch nodes, wherein b is a total number of switch node input/output port pairs, N is a total number of network input/output port pairs, and $\lceil \log_b N \rceil$ indicates a ceiling function providing the smallest integer not less than $\log_b N$, the stages thereby providing a plurality of paths between any network input port and network output port to enhance fault tolerance and lessen contention; and

(b) combining back channel replies received from the destinations into a single result in the multistage interconnect network, wherein the result is transmitted on the back channel to the source.

159. The method of claim 158, further comprising steering a multicast request for a supercluster to a bounce back point within the multistage interconnect network, wherein all multicast requests to the supercluster use the same bounce back point.

160. The method of claim 159, further comprising steering a multicast request from one supercluster to a destination supercluster through a bounce back point for the destination supercluster within the multistage interconnect network.

161. The method of claim 159, further comprising permitting only one multicast request at a time within a supercluster, thereby preventing deadlock between competing multicast requests.

162. A system for transmitting messages, comprising:

- (a) a plurality of switch nodes connected together in a multistage interconnect network using forward channel and back channel signal paths therebetween; and
- (b) means for multicast transmitting forward channel messages from a source connected to the multistage interconnect network to one or more destinations connected to the multistage interconnect network; and
- (c) means for combining back channel replies received from the destinations into a single result, wherein the result is transmitted on the back channel to the source.

163. The system of claim 162, further comprising means for steering a multicast request for a supercluster to a bounce back point within the network, wherein all multicast requests to the supercluster use the same bounce back point.

164. The system of claim 163, further comprising means for steering a multicast request from one supercluster to a destination supercluster through a bounce back point for the destination supercluster.

165. The system of claim 163, further comprising means for permitting only one multicast request at a time within a supercluster, thereby preventing deadlock between competing multicast requests.